

LARP

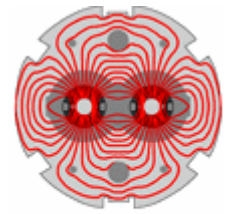
LHC@FNAL

Remote Operations for CMS & LHC

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Fermilab



Introduction



LARP

We are developing plans for a joint CMS and LHC remote operations center located on the first floor of Fermilab's Wilson Hall.

We are looking for feedback:

- What functionality is important to you?
- What physical aspects are important to you?

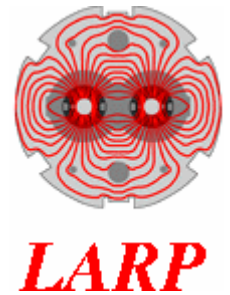
Please send feedback to **erik@fnal.gov** or **remop@fnal.gov**

Additional information is available:

<http://cd-amr.fnal.gov/remop/remop.html>



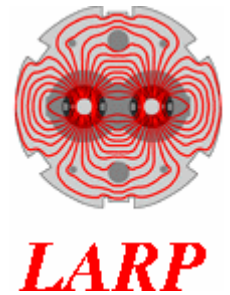
Overview



- **CMS and LHC control rooms at CERN**
- **Remote operations centers**
- **Plans for LHC@FNAL**
- **Summary**



Control Rooms at CERN

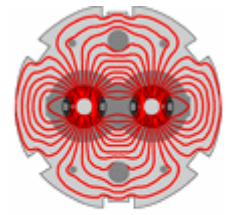


- Temporary MTCC control room (“green barracks”)
- CMS control room at Point 5
 - Under construction
 - Small control room, low ceiling
 - ~13 km from CERN (Meyrin)
- New accelerator control room – **CERN Control Centre**

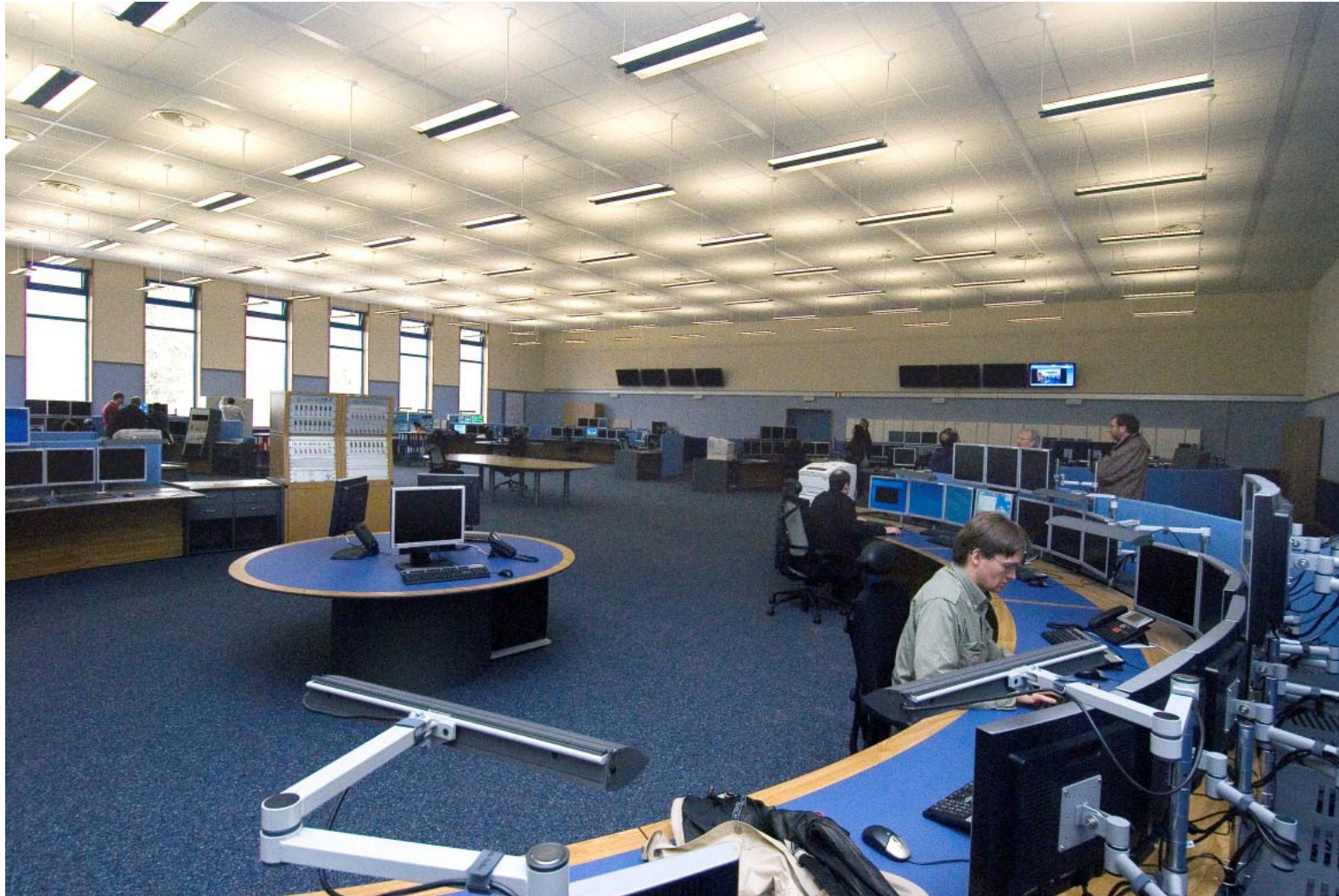
The CCC combines all of the control rooms for the accelerators, cryogenic systems and technical infrastructure into one room. The CCC began operations on February 1st, 2006.



CERN Control Centre

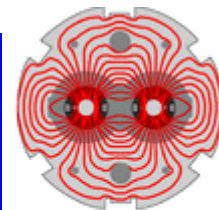


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Remote Operation of CMS



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- How will CMS operate?
- This was discussed during CPT Week at CERN, Jan.-Feb. 2006.

Friday 03 February 2006

CCAR Meeting (2006-02-03 08:30->12:30)

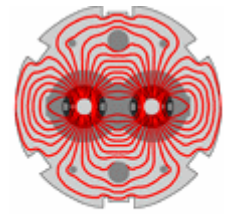
Chairperson: Paris Sphicas

Room: [40-S2-A01](#)

08:30	Introduction (15) (transparencies)	Paris
08:45	Current plans for CCAR (25) (more information)	Hans Hoffmann
09:10	Infrastructure for CCAR (30) (more information)	Werner Jank
09:40	VRVS: status and future (15) (more information)	Philip Galvez
09:55	Monitoring: Monalisa (15) (transparencies)	Iosif Legrand
10:10	Break	
10:40	Experience from CDF II Detector Operations (20) (more information)	Jeff Spalding
11:00	CDF Offline Operations (20) (transparencies)	Rob Harris
11:20	Babar offline operations (20) (transparencies)	Peter Elmer
11:40	FNAL Remote Control Room (20) (more information)	Kaori Maeshima



Remote Operation of CMS



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Why does CMS need remote operations?

- SX5 is ~13 km from Meyrin
- SX5 lacks “infrastructure” available at Meyrin (people)
- CMS control room, currently under construction, is “tiny”
- CMS control room has a low ceiling
- SX5 does not have large and small meeting rooms that are necessary for daily/weekly meetings and expert space

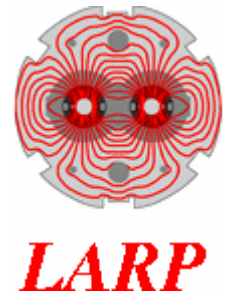
Paris Sphicas:

Asymptotically, at sufficiently long times after startup, we will run CMS remotely

- This is not a question of whether this will happen – it’s a question of when.



Remote Operations Centers



- CCAR (planned for Meyrin)
 - Remote operations (and control) center for CMS operations
 - Described as the “heartbeat” of CMS at CERN
- ROC and LHC@FNAL
 - Remote operations center for CMS commissioning and operations, and LHC beam commissioning and operations



CCAR (possible) layout

Towards
Main
Building

Space breakdown

Control room	1	150 m ²
Conference room	1	300 m ²
Meeting/VRVS room	1	70 m ²
Technical room	1	80 m ²
Group work room	1	140 m ²

Office space	40	400 m ²
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Available cooling power
110kW

New printshop

Visitors

Secr.

Meeting

Control room

Office

Visitors

Office

Collaborative work

Conference

Office

Tech



CCAR Basic concept

- Allow operations team to work effectively together!
- Facilitate communication of all kinds
 - Technical communications
 - Point 5
 - LHC control room
 - Tier-0
 - CAF
 - Outside facilities (Tier-1's, Tier-2's)
 - People communications
 - Between “operators”
 - Subdetectors
 - Calibration / alignment
 - express line(s)
 - (prompt) analysis groups
 - Physics community
 - Regular (daily/weekly) updates
- Become “Centre of Operations”



Monitoring (Remote Control) Room - 1

- Monitoring
 - Initially used for monitoring, real CR at P5 only!
 - Clone of Point-5 CR (to some extent)
 - Acquire experience and confidence for control operations
 - Understand sharing of responsibilities for distributed control
 - Video link to Point-5
 - Detector status
 - LHC status
 - Physics displays
 - Express line
 - Event displays
 - Histograms, data quality, ...
 - Webcam displays
 - ...



Monitoring (Remote Control) Room - 2

- (CMS Offline!) Computing operations
 - Excellent communications with Point-5, IT and outside experts!
 - Needed from the beginning!
 - Making full use of IT facilities and services
 - Tier-0, CAF
 - COOL, 3D, LSF, AFS, Castor2
 - General services
 - interactive service, build system, ORACLE, Monitoring
 - GRID services
 - RB, BDII, SE, CE, FTS, SRM, GridFTP, Myproxy
 - Complementary CMS services
 - Non-IT
 - DBS, DLS admin and operation, fast File- and CPU servers, graphics servers,...
 - Tier-1's
 - Phedex, Frontier, data management, heartbeat

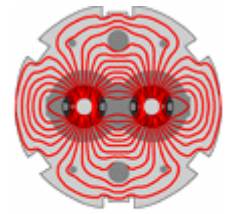


CCAR Summary

- CERN CMS Operations Centre?
 - Remote Control Room
 - Tier-0 operation
 - CAF (calibration, alignment,...)
 - DQM
 - Physics Analysis
 - Tier-1 data distribution, communication
 - More (validation of concept, outreach,...)
- Goals very similar to LHC@FNAL and LPC at Fermilab
 - We can/should work together to make these efforts a success.



Remote Operations for US-CMS

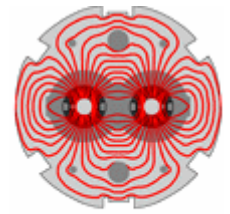


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- 1) Create an environment for remote participation from North America for CMS and LHC commissioning and operations.
- 2) Facilitate communication with CMS and LHC control rooms, and help contribute our expertise.
 - Remote shift activities
 - Call center for US-CMS collaborators to access information about CMS and the LHC accelerator.
 - Introduce collaboration tools to improve communication
- 3) Take advantage of a unique opportunity to have detector and accelerator experts working together to solve problems.



Goals for ROC & LHC@FNAL

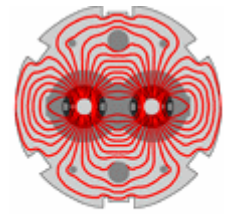


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- Participate in CMS and LHC shifts from the U.S.
- Participate in CMS and LHC data monitoring and analysis
- Monitor US-CMS computing operations
- Develop and test new monitoring capabilities
- Provide access to data, data summaries, and analysis results
- Provide training in preparation for shift activities at CERN
- Assist in establishing communications between accelerator and detector experts in North America and CERN



LHC@FNAL Task Force



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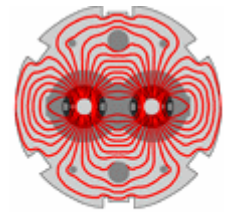
- Erik Gottschalk – Chair (FNAL-PPD)
- Kurt Biery (FNAL-CD)
- Suzanne Gysin* (FNAL-CD)
- Elvin Harms* (FNAL-AD)
- Shuichi Kunori (U. of Maryland)
- Mike Lamm* (FNAL-TD)
- Mike Lamont* (CERN-AB)
- Kaori Maeshima (FNAL-PPD)
- Patty McBride (FNAL-CD)
- Elliott McCrory* (FNAL-AD)
- Andris Skuja (U. of Maryland)
- Jean Slaughter* (FNAL-AD)
- Al Thomas (FNAL-CD)

* Accelerator Subgroup

LHC@FNAL also has an advisory committee with members from Universities, FNAL, CERN-PH, CERN-AB, and CERN-TS.



Planning for LHC@FNAL

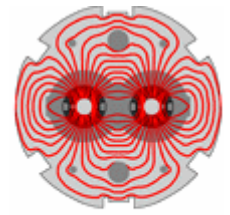


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- The LHC@FNAL task force developed a plan for CMS remote operations based on discussions with members of CDF, D0, CMS HCAL and trackers groups.
- We worked with CMS and US-CMS management at all steps in the process.
- A requirements document for LHC@FNAL was prepared and reviewed last summer.
- We visited 9 sites (e.g. Hubble, NIF, ESOC) to find out how other projects do remote operations.
- The goal is to have LHC@FNAL ready before the start of beam – perhaps by the end of 2006.



Timetable

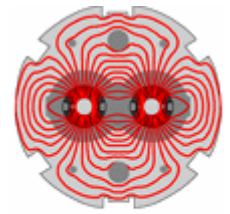


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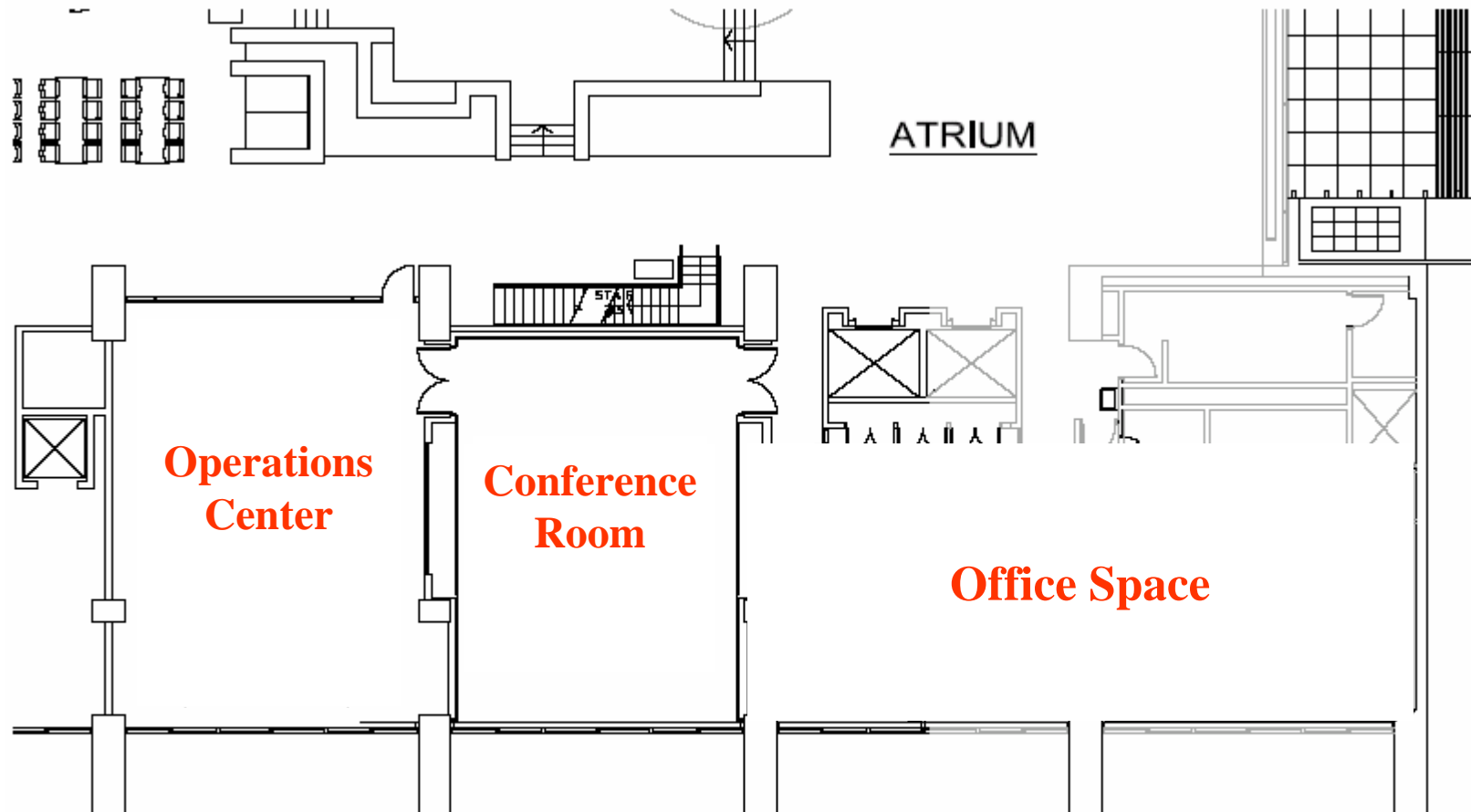
- ROC renovation started – June 2005
- LHC@FNAL Requirements Review – July 2005
- Preliminary requirements document – July 2005
- ROC renovation completed – September 2005
- Developed LHC@FNAL plan – Fall 2005
- WBS presented to FNAL Directorate – Feb. 2006
- Looking for feedback now! Meet with FESS next week.
- FESS engineering start – March 2006
- LHC@FNAL construction completed – End of 2006
- Move ROC operations to LHC@FNAL – Spring 2007



New Location & Layout

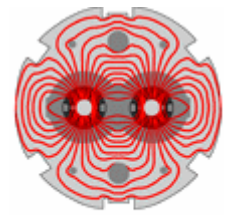


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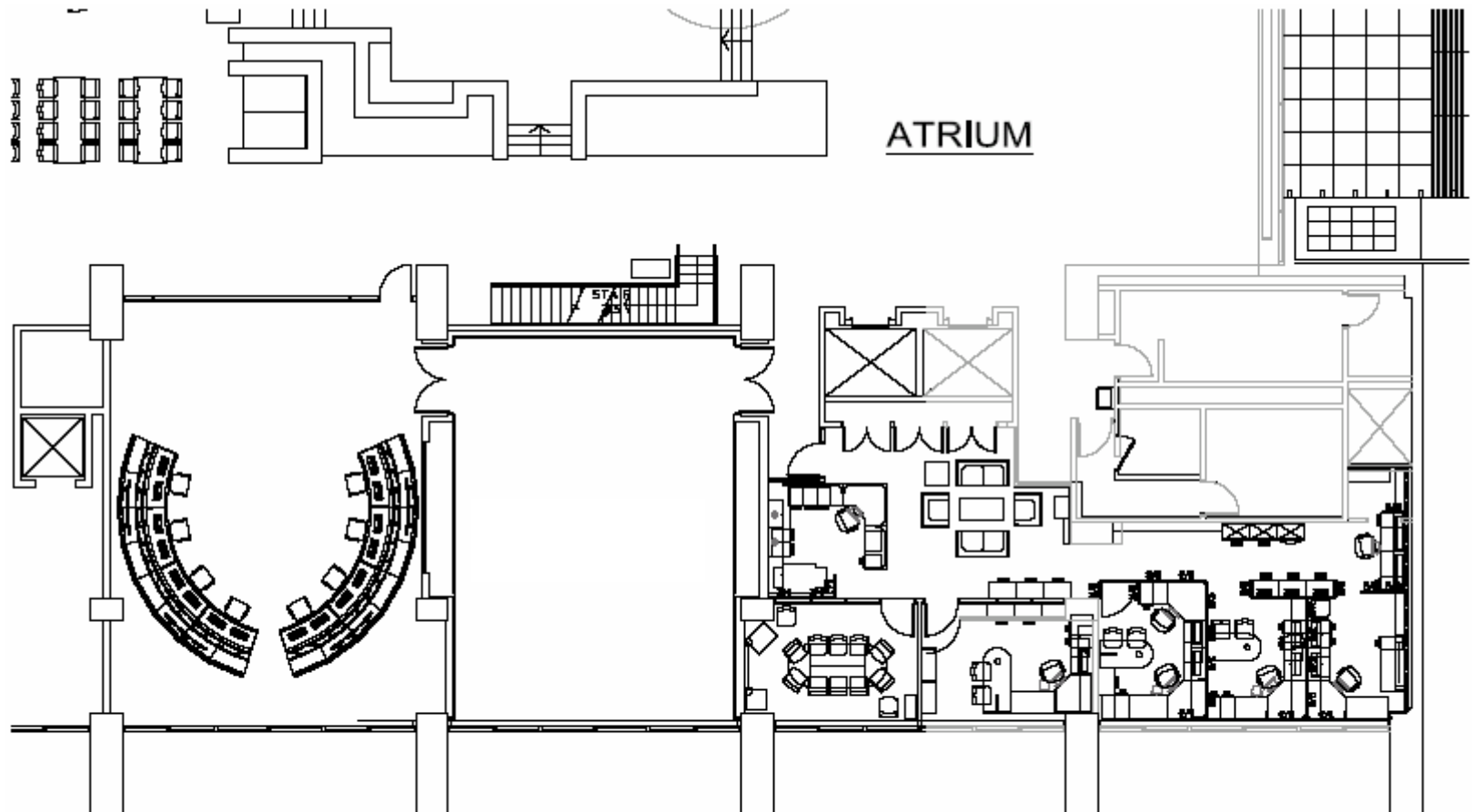




Another possible Layout



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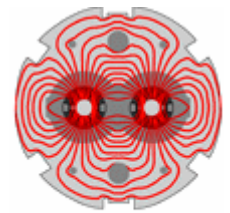


SCHEME 2

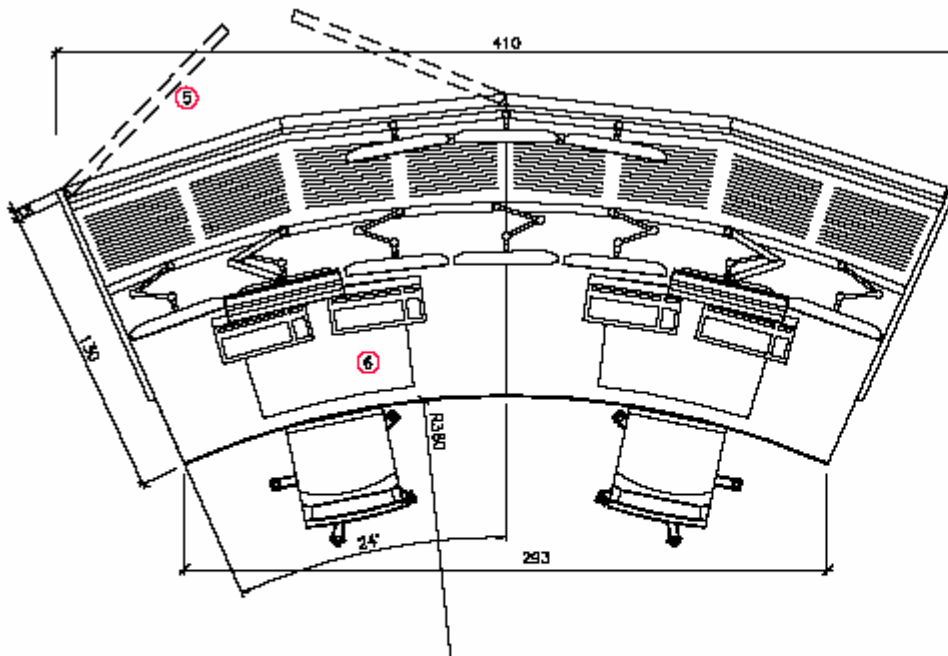
NO SCALE



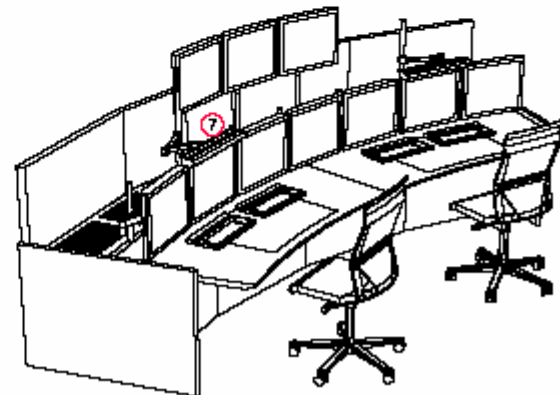
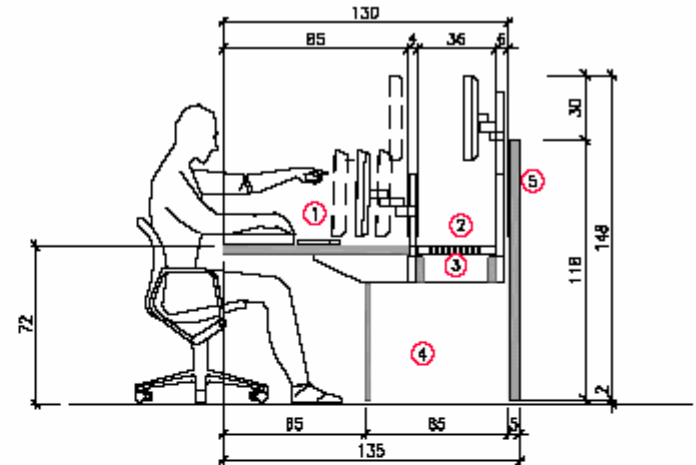
Consoles



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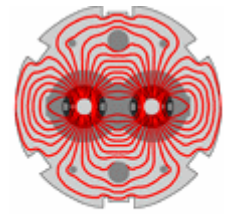


- ① Work top
- ② Monitor top
- ③ Cable channel
- ④ Installation room
- ⑤ Acoustic screen doors
- ⑥ Insert
- ⑦ Light-top





Possible CMS Activities



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Operations Center:

- Online shifts (DQM, trigger monitoring)
- Offline shifts (data processing, data distribution, GRID)
- Miscellaneous (shift training, DB maintenance)
- Call center for US-CMS

Conference Room (integrated with Ops. Center):

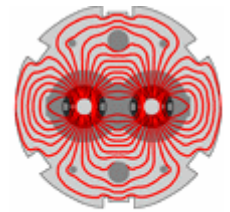
- Weekly meetings

Office Space:

- Two small meeting rooms (3 – 5 people each)
- Expert space
- Rest area for shifters



Summary



LARP

We are developing plans for a joint CMS and LHC remote operations center, and are looking for feedback.

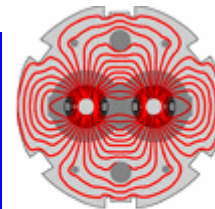
If you have any questions or suggestions contact:

- erik@fnal.gov
- remop@fnal.gov (LHC@FNAL task force mailing list)

To continue discussions on remote operations we have asked FESS to present current plans and design ideas next Friday, March 10, 2006.



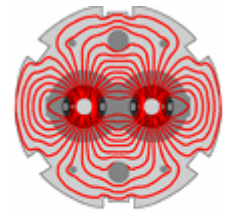
Additional Slides



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Assumptions



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For CMS

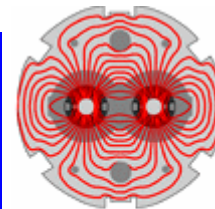
- CMS will have a shift schedule, a run plan, and a protocol that defines responsibilities and roles of shift personnel. We assume that a shift leader is responsible for CMS shift activities.
- LHC@FNAL will have shift operators who will be able to assist US-CMS collaborators with CMS activities during commissioning and operations.
- LHC@FNAL will participate in CMS shifts. Neither the duration nor the frequency of the LHC@FNAL shifts has been determined.
- The CMS Collaboration will have a protocol for access to the CMS control system (PVSS), and a policy for how access to the control system will vary depending on the physical location of an individual user.
- The CMS Collaboration will have a policy that defines how DAQ resources are allocated. This includes allocation of DAQ resources to various detector groups for calibration and testing.
- The CMS Collaboration will have a protocol that defines how on-demand video conferencing will be used in CMS control rooms and LHC@FNAL.
- The CMS Collaboration will provide web access to electronic logbook and monitoring information to collaborators worldwide
- The CMS Collaboration will maintain a *call tree* that lists on-call experts worldwide for each CMS subsystem during commissioning and operations

For both CMS & LHC

- LHC@FNAL will comply with all CERN and Fermilab safety and security standards.



Site Visits



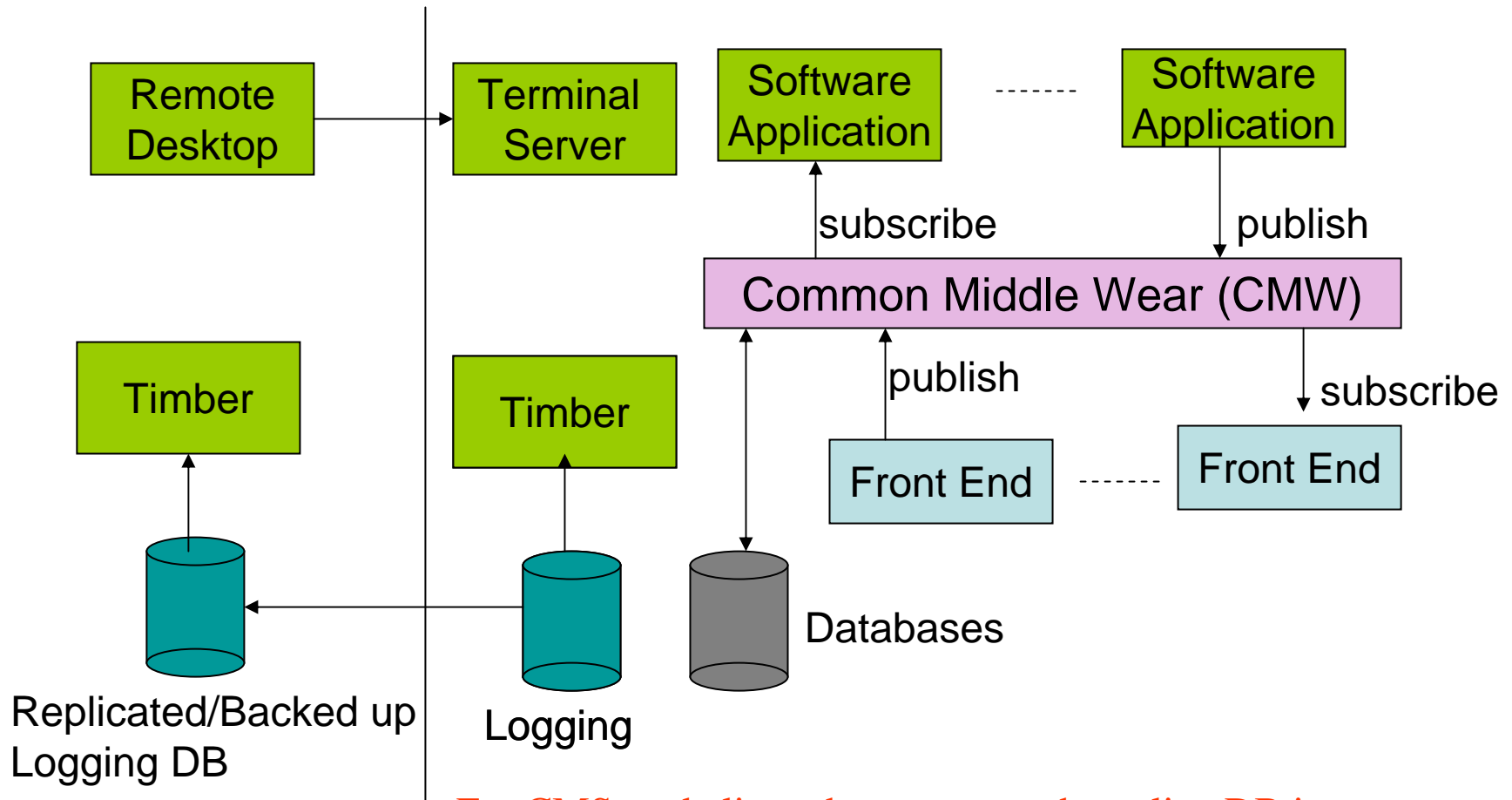
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- **Technology Research, Education, and Commercialization Center (TRECC) – West Chicago, Illinois** (Aug. 25, 2005)
- **Gemini Project remote control room – Hilo, Hawaii** (Sept. 20, 2005)
 - <http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=425>
- **Jefferson Lab control room – Newport News, Virginia** (Sept. 27, 2005)
 - <http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=505>
- **Hubble Space Telescope & STScI – Baltimore, Maryland** (Oct. 25, 2005)
- **National Ignition Facility – Livermore, California** (Oct. 27, 2005)
 - <http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=532>
- **General Atomics – San Diego, California** (Oct. 28, 2005)
- **Spallation Neutron Source – Oak Ridge, Tennessee** (Nov. 15, 2005)
 - <http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=570>
- **Advanced Photon Source – Argonne, Illinois** (Nov. 17, 2005)
- **European Space Operations Centre – Darmstadt, Germany** (Dec. 7, 2005)
 - <http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=622>

Baseline for LHC Remote Access

LHC@FNAL

LHC Technical Network



For CMS we believe that access to the online DB is necessary.

Preferred Model for Remote Access

LHC@FNAL

LHC Technical Network

